

WHAT IS CLAIMED AS NEW AND IS DESIRED TO BE SECURED BY  
LETTERS PATENT OF THE UNITED STATES IS:

5        1. An image reading apparatus comprising:  
         a photoelectric transducer configured to read an  
image of a document and to output an analog image signal;  
         an A/D converter configured to input the analog image  
signal and output a corresponding digital image signal;  
10        an offset level detecting circuit configured to seek  
an average value of output levels from picture elements in  
a predetermined range of the photoelectric transducer;  
         an offset setting unit configured to provide an  
offset in the analog image signal before the A/D  
5        conversion on the basis of the average value;  
         a first comparing device configured to compare the  
average value to a predetermined target value; and  
         an adjusting device configured to adjust a size of  
the predetermined range of the photoelectric transducer on  
0        the basis of a result of the comparison.

2. The image reading apparatus of claim 1, wherein  
the adjusting device enlarges the predetermined range of  
the photoelectric transducer when a difference between the  
25        average value and the target value is smaller than a  
predetermined value.

3. The image reading apparatus of claim 2, wherein  
the first comparing device comprises a second comparing  
30        device configured to compare the difference between the  
average value and the target value to a first  
predetermined value which is previously set, and a third

comparing device configured to compare the difference to a second predetermined value which is previously set and which is smaller than the first predetermined value,

and further wherein, the adjusting device repeats the adjustment until the second comparing device judges that the difference is less than the first predetermined value, and when the difference is less than the first predetermined value, the predetermined range of the photoelectric transducer is made a maximum, and the third comparing device compares the difference to the second predetermined value after the predetermined range is made maximum.

4. The image reading apparatus of claim 1, wherein the picture elements in the predetermined range of the photoelectric transducer are optical black picture elements of the photoelectric transducer.

5. A copying machine comprising:

an image reading apparatus including;

a photoelectric transducer configured to read an image of a document and to output an analog image signal;

an A/D converter configured to input the analog signal and output a corresponding digital image signal;

an offset level detecting circuit configured to seek an average value of output levels from picture elements in a predetermined range of the photoelectric transducer;

an offset setting unit configured to provide an offset in the analog image signal before the A/D conversion on the basis of the average value;

a first comparing unit configured to compare the

average value to a predetermined target value; and

an adjusting device configured to adjust a size of the predetermined range of the photoelectric transducer on the basis of a result of the comparison; and

5 an image forming apparatus configured to form an image on the basis of image data of a document which is read by the image reading apparatus.

6. An image reading apparatus comprising:

10 transducing means for reading an image of a document and for outputting an analog image signal;

A/D converting means for converting the analog signal to a digital image signal;

offset level detecting means for seeking an average value of output levels from picture elements of predetermined range of the transducing means;

offset setting means for providing an offset in the analog image signal before the A/D conversion on the basis of the average value;

first comparing means for comparing the average value to a predetermined target value; and

adjusting means for adjusting a size of the predetermined range of the transducer means on the basis of a result of the comparison.

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7. A method of image reading, comprising steps of:

reading an image of a document and outputting an analog image signal with a photoelectric transducer;

30 converting the analog signal to a digital image signal;

seeking an average value of output levels from picture elements of a predetermined range of the

photoelectric transducer;

setting offset in the analog image signal before the A/D conversion on the basis of the average value;

comparing the average value to a predetermined target value as a first step of comparing; and

adjusting a size of the predetermined range of the photoelectric transducer on the basis of a result of the comparison.

8. The method of claim 7, wherein the adjusting step comprises:

adjusting the predetermined range of the photoelectric transducer to be larger when a difference between the average value and the target value is smaller than a predetermined value.

9. The method of claim 8, wherein the first step of comparing includes a step of comparing the difference between the average value and the target value to a first predetermined value which is previously set as a second step of comparing, and a step of comparing the difference to a second predetermined value which is previously set and is smaller than the first predetermined value as a third step of comparing,

and further wherein, the adjusting step repeats the adjustment until the second step of comparing judges that the difference is less than the first predetermined value, and when the difference is less than the first predetermined value, the predetermined range of the photoelectric transducer is made a maximum, and the third step of comparing compares the difference to the second predetermined value after the predetermined range is made

maximum.

10. The method of claim 7, wherein the picture elements in the predetermined range of the photoelectric transducer are optical black picture elements of the photoelectric transducer.

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$$\frac{1}{\sqrt{2\pi}} \int_{-\infty}^{\infty} \frac{e^{-i\omega t}}{\omega} d\omega = \begin{cases} 1 & t > 0 \\ 0 & t = 0 \\ -1 & t < 0 \end{cases}$$

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